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Pothole Patching with Small-Scale Asphalt Recycling Equipment

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Prepared for

UPSIG

Upper Plains States Innovation Group

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UPSIG

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POTHOLE PATCHING

WITH

SMALL SCALE ASPHALT RECYCLING EQUIPMENT

1839 E. Capitol Ave. - Bismarck, No. Dak. 58501

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UPSIG

Upper Plains States Innovation Group

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The league of cities and association of counties in Montana, North and South Dakota, and Wyoming each appoints a representative to the UPSIG Board of Directors. As such, UPSIG serves as the technology arm of these organizations. The Board of Directors selects UPSIG's project efforts, including the topic covered in this document. UPSIG is not a consultant, but rather addresses technical problems faced by many localities and attempts to bring about common solutions to these problems.

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POTHOLE PATCHING
WITH
SMALL SCALE ASPHALT RECYCLING EQUIPMENT

Introduction

Potholes are not only a persistant nuisance to taxpayers, but are a costly and time consuming aggravation to city and county governments. The generally desired patching material, hot asphalt from a hot mix plant, is not available during off-construction seasons. Alternative patching materials, including cold mix, are often a temporary fix requiring additional time, materials, and aggravation to taxpayers and the local government when the patch fails.

A New Approach

Several small scale asphalt recycling devices are available to city and county governments for use in patching potholes. The price of these devices ranges from about $5,800 to $16,000. The device is mounted on a small trailer frame and towed behind a pick-up or dump truck which carries the asphalt to be recycled. (One model is mounted on the dump truck tailgate.) The asphalt is processed through the recycler at the job site, comes out hot, and is used just as a hot plant mix would be used for filling potholes.

These tow-along recyclers produce from two to twelve*

*Although some of these recyclers have these higher production capabilities, the maximum amount of asphalt that two men are capable of feeding into the recycler is about two to three tons per hour.

tons of hot asphalt per hour. They are of value during winter months when hot mix plants are not in operation, or where a hot mix plant is not nearby; recycled hot mix from these devices is a low cost, permanent pothole patching alternative to cold mix and other commercially available products. Cutback cold mixes are becoming increasingly less available because of: 1) increasing environmental emission controls on cutback production, 2) an increasing demand for the use of these petroleum products as energy sources rather than for use in producing cold mixes.

A larger city or county may find that the output of these small scale recyclers is not sufficient during the spring repair season and will probably return to hot plant mix when available. Unlike large scale mobile asphalt recycling plants costing up to several hundreds of thousands of dollars, these small scale recyclers are not intended for major paving operations; but only for minor repairs.*

Cost Considerations

As with the purchase of any road-type equipment, there are a variety of features which distinguish one manufacturer's equipment from another's and which are reflected in the price of the equipment. In addition to differences in production rates and operating costs, some of these features on small scale asphalt recyclers include an insulation package for cold weather operation, automatic temperature control, safety features, and the maximum size of chunks which will fit into the device. Prospective purchasers should compare the features of the devices

*Small scale product lines are also available for producing a few tons of virgin hot mix asphalt per hour. These tow-along units are not recyclers, but rather produce virgin hot mix by combining heated aggregate with asphalt from a heated tank.

which they are considering in light of their requirements and available funds. Consideration should also be given to the fuel requirements (primarily propane) to operate the equipment. Recyclers with higher production rates can use up to a 100 pound cylinder of propane per eight hours of operation at temperatures below 20 degrees F.*

In evaluating the cost-effectiveness of these small scale asphalt recyclers, local government decisionmakers should consider the level of reduced expenses to patch potholes throughout the life of the recycling equipment. Cost savings will be realized through the reduced frequency of patching the same potholes as well as by re-using asphalt for which the community has already paid. The experiences of one city have demonstrated that the cost per pothole for recycled asphalt is about the same as for plant hot mix when man-time, equipment costs, and operating costs are all considered. The cost per pothole for cold mix was found to be several times more expensive than hot mix, or recycled mix, since cold mix patches had to be repaired several times per year.

How Small Scale Recyclers Work

Most small scale recyclers have a hopper fed drum which is turned by a small gasoline powered, air cooled engine. A propane torch shoots a flame into the drum as it turns, softening the recycled asphalt. Drum temperatures for recycling run at least 300° F. These temperatures remove distillates from cold mixes, yielding more stable patches. Although cold mixes and

*Propane consumption above 20 degrees can decrease by 50 percent. Recycled cold mix can require as much as 50 percent less propane than chunks of recycled AC mix.

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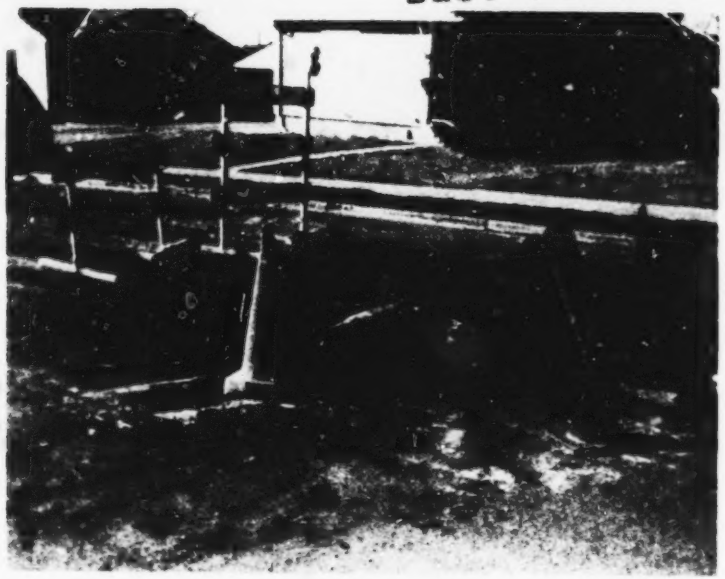
1. 

2.

3.

1. Pavement removed to repair faulty sub-grade (water main leak).
2. Recycling on-site of the chunk AC pavement which was removed.
3. Completed patch.

salvaged hot mix material of relatively small size (milled material of up to two inches) can be recycled more quickly, salvaged material with chunks up to 17 inches can be handled.

Quality of the Recycled Product

Depending on proper operation of the equipment and quality of the material used, the hot asphalt produced can be just as good for pothole patching as hot plant mix. Asphalt which was originally either a hot mix, or an emulsion or cut-back cold mix, can be recycled through the equipment.

The recycled product will depend on the age and original quality of the recycled pavement. Older pavement recycled from street surfaces will be less workable than newer pavement or cold mix stockpile, and may be in need of rejuvenation. Additionally, base gravels, which may have adhered to the asphaltic concrete when removed from the streets or parking lots, may be processed. The quality of the product can be improved by the addition, before recycling, of one or two gallons of virgin asphalt per ton, or by mixing in a higher quality used pavement. Chemical rejuvenators*, or softening agents, are sometimes used to improve the quality of recycled asphalt.

Pothole Patching Procedures

Regardless of the material used, the proper procedures should be followed in patching a pothole. (see following page)

*See FHWA Report No. FHWA-TS-79-204; Evaluation of Selected Softening Agents Used in Flexible Pavement Recycling; 4/78; available from FHWA, Office of Research and Development, Washington, DC 20590 (202) 426-9230.

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1

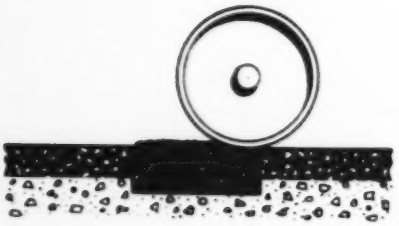
Untreated pot hole.

2

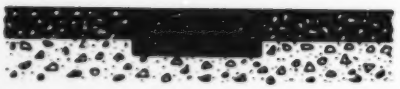
Surface and base removed to firm support.

3

ack coat applied.

4 

Full-depth asphalt mixture placed and being compacted.

5 

inished patch compacted to level of surrounding pavement.

POTHOLE PATCHING PROCEDURES

MANUFACTURERS AND USERS

FOR ADDITIONAL INFORMATION, INCLUDING DISTRIBUTORS, CONTACT:

Aeroil AR-1

Price: $8,153.*

Capacity: 3 tons/hour

Aeroil Products Company, Inc.
69 Wesley Street
South Hackensack, NJ 07606
(201) 343-5200

Users:

Highway Superintendent
Williams County Courthouse
Williston, ND 58801

Dept. of Public Works
City Hall
Ainsworth, NE 69210

Dept. of Public Works
City Hall
Alliance, NE 69301

Dept. of Public Works
City Hall
Norfolk, NE 68701

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Bomag AR-5

Price: $9,500.*

Capacity: 5 tons/hour

Koehring Co.
Compaction & General Equip. Group
P.O. Box 157
Dayton, OH 45401
(513) 461-4860

Users:

Street Department
City Hall
Brookings, SD 57006

Public Works Dept.
City Hall
Grosse Pointe Woods, MI 48236

Public Works Dept.
City Hall
Menomonie, WI 54715

Public Works Dept.
Box 307
Valdez, Alaska 99686

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McConnaughay HTD Mixer
(Three models)

Price: $7,267 - $15,913.*

Capacity: 4-10 tons/hour

Asphalt Equipment Co., Inc.
13333 U.S. Highway 24 West
Fort Wayne, IN 46804

Users:

Howard Rees
Purchasing Dept.
City Hall
Cheyenne, WY 82001

Dept. of Public Works
City Hall
Green River, WY 82935

Dept. of Public Works
City Hall
Green Bay, WI 54301

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Mini-Eagle

Price: $8,500 - $9,000.*

Capacity: 8 tons/hour

Las Vegas Paving Corp.
1770 Industrial Road
Las Vegas, NV 89102
(702) 384-9046

Users: Projected availability in Spring, 1981.

*All prices are as of March, 1981

MANUFACTURERS AND USERS (CONT'D)

Porta Patcher

Price: $16,126.*

Capacity: 12 tons/hour

Brown Equipment Co.
10222 13th Street
Baer Field
Fort Wayne, IN 45809
(219) 747-2312

Users:

Donavon Thiel
Dept. of Public Works
Box 1578
Bismarck, ND 58501
(701) 222-6431

Public Works Director
324 Eighth Ave.
Langdon, ND 58249

Public Works Director
City Hall
Douglas, WY 82633

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Simpson Recycler

Price: $10,000.*

Capacity: 4 tons/hour

Simpson Manufacturing
1821 Lowell Ave.
Butte, MT 59701
(406) 792-9926

Users: Jim Johnson, Director
Dept. of Public Works
Butte-Silver Bow Courthouse
Butte, MT 59701

Pat Kane, Maint. Supt.
State Highway Dept.
Butte, MT 59701

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Wylie Model 30-R
(Heat-A-Mix Tailgate Mixer)

Price: $5,795.*

Capacity: 2 tons/hour

E.D. Etnyre and Co.
P.O. Box 72
Oregon, IL 61061
(815) 732-2116

This is a removable unit, suspended from the truck tailgate. The internal operation of this unit is different from that described for the other small scale recyclers; a heated pug mill is used rather than a direct flame.

Users:

Public Works Dept.
City Hall
Shelby, MT 59474

Public Works Dept.
City Hall
East Helena, MT 59635

Public Works Dept.
City Hall
Mandan, ND 58554

Highway Dept.
Lewis & Clark County
Courthouse
Helena, MT 59601

*All prices are as of March, 1981